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Kyoto University

INVERTEBRATE FAUNA OF THE INTERTIDAL ZONE OF THE TOKARA ISLANDS

XIV. STONY CORALS AND HYDROCORALS[1)2)]

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With Plates XXXI–XXXII

The weak development of living reef corals along the raised reefs in the Tokara Islands, where is approximately the northernmost limit of real coral reefs (30°N. Lat.), has been noted by TOKIOKA (1953) and BABA (1954), who gave a brief sketch of the reefs and the inhabitants living there with many excellent photographs. As they noted, living corals usually grow only at crevices and holes which are found here and there on the raised reef covered by purplish Melobesiae, or at the reef margin under low tide level. So there can be seen weakly developed coral reef, particularly at Takarazima. Dr. TOKIOKA, in describing the outline of the shore and its life, recognized the occurrence of only 9 species of the living corals.

The present paper presents the results of a re-examination of Dr. TOKIOKA's collection, all deposited in the collections of the Seto Marine Biological Laboratory, and a few additional materials collected by Dr. BABA and Mr. HORI during the scientific survey which are in the collections of the Osaka Municipal Museum of Natural History.

As a result of this work, 15 species belonging to 10 genera, including one species of hydrocorals, were identified. This number is far less than those species previously recorded from Amami-ôsima and adjacent islets including Tokara Islands, a total of 63 species being now known from the area (YABE & SUGIYAMA, 1935a, b; SUGIYAMA, 1937, p. 50). The list presented here, though small in number of species, is of interest since it records most of the common species growing so far southward, but unknown from this area. This new distributional records aid in the delimitation of the geographical range of many previously described species. Although the coral collection in this area and the environs is still meagre, the results obtained indicate the need of much more extensive exploration in all islets of the Ryukyu Islands from south to north.

1) Scientific Survey of the Tokara Islands, Report No. 31.
2) Contributions from the Seto Marine Biological Laboratory, No. 283.

In the present paper the systematic arrangement of the species is followed VAUGHAN and WELLS' system (1943). Abbreviations used in the text are as follows:

Tokara Collection in the Seto Marine Biological Laboratory.....TK. No. —
Osaka Municipal Museum of Natural History.....O.M.M.

I wish to express my appreciation at this time to Dr. Takasi TOKIOKA of our Laboratory and Mr. Yoshitaka TSUTSUI, Director of the Osaka Municial Museum of Natural History and leader of the Scientific Survey of the Tokara Islands in 1953, for the opportunity to study on the coral collection. Special thanks are also due to Dr. Kikutaro BABA and Mr. Osamu TUZIMOTO, other members of the Scientific Survey, for the free use of photographs taken at the field.

SCLERACTINIA

Family Seriatoporidae M. EDWARDS & HAIME

1. *Pocillopora damicornis* (LINNÉ)

Pocillopora damicornis HOFFMEISTER, 1925, p. 15, pl. 1, fig. 1 (synonymy); YABE, SUGIYAMA & EGUCHI, 1936, p. 12, pl. 4, figs. 3–5.

Material examined. A complete specimen (O.M.M.), K. BABA coll. Takarazima. A fragment (TK. No. 586), T. TOKIOKA coll. Takarazima.

Distribution. East Indian and tropical West-Pacific northward to Kusimoto, middle Honsyu.

2. *Pocillopora verrucosa* (ELLIS & SOLANDER)

Pocillopora verrucosa VAUGHAN, 1918, p. 77, pl. 23, figs. 1–2a; YABE, SUGIYAMA & EGUCHI, 1936, p. 14, pl. 3, figs. 3–4.

Material examined. Three fragments (TK. No. 585), T. TOKIOKA coll. Takarazima.

Distribution. East Indian and tropical West-Pacific northward to Kita-Daitôzima, SE of Ryukyu Islands.

Family Acroporidae VERRILL

3. *Acropora formosa* (DANA)

(Pl. XXXII, Fig. 3)

Acropora formosa HOFFMEISTER, 1925, p. 55, pl. 8, figs. 1–3 (synonymy); FAUSTINO, 1927, p. 259, pl. 84, figs. 1–4; WELLS, 1950, p. 35.
Acropora gracilis FAUSTINO, 1927, p. 257.

Material examined. Two specimens (O.M.M.), M. HORI coll. Takarazima.

Both specimens are small, shrubby colonies with slender, much divided branches,

about 7–11 cm across and 9 cm in height. The branches are rather slender, mostly not over 1 cm in diameter and several short branchlets with a few tubular corallites occur near the branch-tips. The axial corallites are 2 mm in diameter, 1 to 2 mm exsert. Many of the radial corallites are tubo-nariform, their tips being truncated obliquely and 2 mm long. Other smaller corallites between them are immersed. In these respects the specimens are very close to "*gracilis*" form.

Distribution. East Indian and tropical West-Pacific northward to Amami-ôsima.

4. *Acropora abrotanoides* (LAMARCK)

Madrepora abrotanoides BROOK, 1893, p. 56.
Acropora abrotanoides VAUGHAN, 1918, p. 166, pl. 68, figs. 1–2.

Material examined. Four fragments (TK. No. 587), T. TOKIOKA coll. Nakanosima. Seven fragments (TK. No. 588), T. TOKIOKA coll. Takarazima.

Of these fragments, one somewhat complete specimen corresponds very closely to VAUGHAN's figured specimen from Murray Island in growth-form and in the peculiar arrangement of large radial corallites; some of them are tubular like the axial ones, others immersed, subimmersed or half-tubular. The stem is very thick, 2 cm in diameter, broadly expanded up to 3.5 cm at base, and only 6 cm in total height. Axial corallites are large, about 3 to 3.5 mm in diameter and 1 to 1.5 mm exsert; aperture about 1 mm in diameter or more.

Distribution. Tahiti, Great Barrier Reef, Singapore, Taiwan, Botel Tobago, Sakisima Islands (southernmost of Ryukyus).

5. *Acropora pectinata* (BROOK)

(Pl. XXXII, Figs. 4, 5)

Madrepora pectinata BROOK, 1893, p. 95, pl. 27, figs. D, E.
Acropora (*Polystachis*) *pectinata* VAUGHAN, 1918, p. 172, pl. 71, figs. 1–2.

Material examined. A marginal fragment (TK. No. 590), T. TOKIOKA coll. Takarazima.

The specimen is complanate, with flattened under surface forming a loose reticulation. Branchlets on the upper surface are crowded, usually arranged in groups of 2 to 4 along the axis of each branch which is extended horizontally, coalescent to one another, and flattened below. They are directed upward, except near the margin where they are horizontal and shorter; apices about 5 to 10 mm apart. Their average height is 2–3 cm and diameter 6 mm. Axial corallites are tubular, about 2 mm in diameter, with rather large aperture provided with 12 septa. Radial corallites are short, spreading, round-labellate, and 1–1.5 mm in diameter; walls porous, distinctly costulate, down to echinulate. In the marginal area of corallum, axial corallites are more prominent, about 2 mm exsert. On the under surface, all corallites are immersed,

with small aperture except on the marginal area where they are somewhat nariform.

Distribution. Great Barrier Reef, Torres Strait, Ogasawara Islands.

6. *Acropora* cf. *hebes* (DANA)

(Pl. XXXII, Fig. 6)

Acropora hebes VAUGHAN, 1918, p. 174, pl. 73, figs. 2–2a; pl. 74, figs. 1–2b; HOFFMEISTER, 1925, p. 57, pl. 9, figs. 3a–3b.

Material examined. A fragment (O.M.M.), M. HORI coll. Takarazima.

A fragment, consisting of three branches, may probably agree with this species figured by VAUGHAN and HOFFMEISTER. Longest one of the branches is terete, scarcely tapering, 8 cm long and 1 cm in diameter all throughout. Radial corallites are much crowded, subequal, labellate, 1.5–2 mm in average diameter. Another branch is proliferous near the tip, bearing some labellate twig-buds.

Distribution. Fiji Is., Samoa, Great Barrier Reef, Cocos-Keeling Atoll, Marshall Is., Taiwan northward to Amami-ôsima.

7. *Acropora gemmifera** (BROOK)

(Pl. XXXI, Fig. 1)

Madrepora gemmifera BROOK, 1893, p. 142, pl. 21.
Acropora (*Tylophora*) *gemmifera* VAUGHAN, 1918, p. 177, pl. 77, figs. 1–3a.

Material examined. Two fragments, apparently belonging to a single colony (TK. No. 589), T. TOKIOKA coll. Takarazima.

Material collected by Dr. TOKIOKA shows a stunted face of the corallum. It is spreading-corymbose, 7 cm high and 12 cm across from the center of a broad base. Upright branchlets 1–2 cm thick are all unusually short, truncated at tips, showing a repair growth. Axial corallite is however present in the center of each truncated tip, although small and immersed. Such flat-topped formation may be due to the effect of long-term exposure in the levelling of the upper surfaces of colonies by stopping further upward growth.

Dr. BABA's good photograph of a living colony under water gives a better conception of the typical growth-form of this species.

Distribution. Fiji Is., Great Barrier Reef, Torres Strait, Arafura Sea, Pescadores Is., Botel Tobago northward to Sakisima Is. (southernmost of Ryukyus).

Family Agariciidae GRAY

8. *Coeloseris mayeri* VAUGHAN

*) Written as *A. scherzeriana* (BRÜGGEMANN) in TOKIOKA's paper.

Coeloseris mayeri VAUGHAN, 1918, p. 139, pl. 58, figs. 1–3a ; YABE, SUGIYAMA & EGUCHI, 1936, p. 63, pl. 18, figs. 7–8 ; pl. 38, figs. 2–4.

Material examined. One encrusting specimen (TK. No. 591), T. TOKIOKA coll. Takarazima.

Distribution. Bay of Bengal, Batavia, Murray Island, Philippines, Palau, Taiwan and Yonakunizima.

Family Thamnasteriidae VAUGHAN & WELLS

9. *Psammocora contigua* (ESPER)

Psammocora contigua YABE, SUGIYAMA & EGUCHI, 1936, p. 59, pl. 44, figs. 5, 6, 8 ; pl. 45. figs. 2, 3, 6 (synonymy).

Material examined. Two fragments (TK. No. 592), T. TOKIOKA coll. Takarazima.

The corallum is arborescent with knotty heads, but heavily coalesced downward, showing a rough-water form in manner of growth. Small calyces with indistinct columella are arranged in rows in the valleys on the branches.

Distribution. East Indian and tropical West-Pacific, southward to the Tropic of Capricorn and northward to Kita-Daitôzima.

Family Fungiidae DANA

10. *Fungia* sp. (cf. *concinna* VERRILL)

Fungia concinna YABE & SUGIYAMA, 1941, p. 79, pl. 73, figs. 1–1c ; pl. 74, fig. 3 ; pl. 75, figs. 1–2d (synonymy).

Material examined. One beach-worn specimen (O.M.M.), K. BABA coll. Takarazima.

A single much-worn corallum, measuring 10×8.9 cm across and 3 cm high, seems to be closer to *F. concinna* which is common in the Ryukyu Islands than to any other species. Costae on the upper surface are only distinct and regularly alternate in size; base finely costate from the center to the margin.

Distribution. Zanzibar to Samoa, northward to Amami-ôsima.

Family Poritidae GRAY

11. *Porites lutea* M. EDWARDS & HAIME

Porites lutea var. *haddoni* HOFFMEISTER, 1925, p. 75, pl. 21, fig. 3 (synonymy).
Porites haddoni CROSSLAND, 1952, p. 241 (synonymy).

Material examined. One specimen (TK. No. 593), T. TOKIOKA coll. Takarazima.

The specimen is irregularly nodular, encrusting on dead corals, 9×6.5 cm in

extent. According to the key given by VAUGHAN (1918, p. 190), the specimen seems agree with his *haddoni* in the shallow calyces surrounded by thin, delicately spinulose walls. Average diameter of calyces is about 1 mm. Septa 12 in number, rather thick. Palar ring consists of 5 or 6 pali, usually more prominent than the septal trabecular ring pillars; they are tall and densely granulate. Columella deep down, narrower than pali.

Distribution. Great Barrier Reef, Fiji Is., Samoa, Solomon and Palau Islands. Also recorded from Sakisima Islands of Ryukyus and from the coast of Sikoku, Japan.

Family Faviidae GREGORY

12. *Favites aspera* (VERRILL)

(Pl. XXXI, Fig. 2)

Goniastrea aspera FAUSTINO, 1927, p. 141, pl. 33, figs. 1-2; YABE, SUGIYAMA & EGUCHI, 1936, p. 35, pl. 24, fig. 3.
Favites aspera CROSSLAND, 1952, p. 132, pl. 5, figs. 1-2.

Material examined. One specimen (TK. No. 594), T. TOKIOKA coll. Takarazima. One specimen (lost, not available at present), T. TOKIOKA coll. Nakanosima.

One specimen (O.M.M.), K. BABA coll. Takarazima.

A specimen (TK. No. 594) bears a number of pits which have probably been infested by the Hapalocarcinid crab, *Cryptochirus coralliodytes* HELLER.

According to Dr. TOKIOKA, *Favites aspera* is the most abundant among reef corals near the reef margin, both in Takarazima and Nakanosima, commonly mingled with soft zoantharians and alcyonarians which are called "naba" by natives.

Distribution. Philippines, Palau, Taiwan, Ryukyu Islands northward to Udo, SE coast of Kyusyu.

Family Caryophylliidae GRAY

13. *Caryophyllia* cf. *scobinosa* ALCOCK

Caryophyllia scobinosa ALCOCK, 1902, p. 8, pl. 1, figs. 2-2a; YABE & EGUCHI, 1942, p. 119, pl. 10, figs. 4-5.

Material examined. Four beach-worn specimens (TK. No. 595), T. TOKIOKA coll. Takarazima.

The specimens are all denuded on surface, so that exact identification may be hardly possible. The largest one is 30 mm long and 8 mm in diameter at base. Corallum free, lacking calicular part, somewhat curved cylindro-conical. Principal septa are 12, though bearing 31 in all, denticulate on surface. Costae straight, distinct throughout except at base. Columella small, twisted.

Distribution. East Indies, Philippines, Southern Japan northward to Inubô-zaki.

Family Dendrophylliidae GRAY

14. *Balanophyllia fistula* ALCOCK

Balanophyllia fistula ALCOCK, 1902, p. 42, pl. 5, figs. 36–36a; YABE & EGUCHI, 1941, p. 141, pl. 12, figs. 14–16 (synonymy).

Material examined. Three beach-worn specimens (TK. No. 596), T. TOKIOKA coll. Nakanosima.

The largest one, 25 mm long, subcylindrical, gradually tapering toward the pointed base, and bears two small buds perpendicularly fastened to the parent corallite. On outer surface it bears well-developed costae but lacks epitheca.

Distribution. Red Sea, East Indies, Philippines and Japan northward to Inubô-zaki on the Pacific side and to Sado Is. in the Japan Sea side.

STYLASTERINA

Family Stylasteridae GRAY

15. *Distichopora violacea* (PALLAS)

Distichopora violacea HICKSON, 1892, p. 501, pls. 18–19; BOSCHMA, 1953, p. 172 (distribution).

Material examined. Numerous fragments (TK. Nos. 598, 599), T. TOKIOKA coll. Takarazima.

Three specimens (TK. No. 600), T. TOKIOKA coll. Nakanosima.

The specimens, young in all, agree exactly with HICKSON's coloured figures of *Distichopora violacea* drawn from a spirit specimen from Murray Island. The specimens here examined are all dried and bright or dark purple, or rose in colour. Larger unbroken colony reaches 17 mm in height and 25 mm wide. But, in most of them clusters of gastropores, about 0.3 mm across, are visible on the flat surface of the larger stems and branches.

Distribution. East Indies, Torres Strait, Great Barrier Reef, New Hebrides, Tuamotu Is., Tahiti and Jaluit Is. Up to now unknown to occur in Japanese waters.

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EXPLANATION OF PLATES XXXI–XXXII

PLATE XXXI

Fig. 1. *Acropora gemmifera* (BROOK), under water. Photo: K. BABA.

Fig. 2. Colonies of *Favites aspera* (VERRILL), most commonly found on the reef of Takarazima, exposed at low tide. An *Acropora* colony (probably *A. formosa*) is seen in the center. Photo: O. TUZIMOTO.

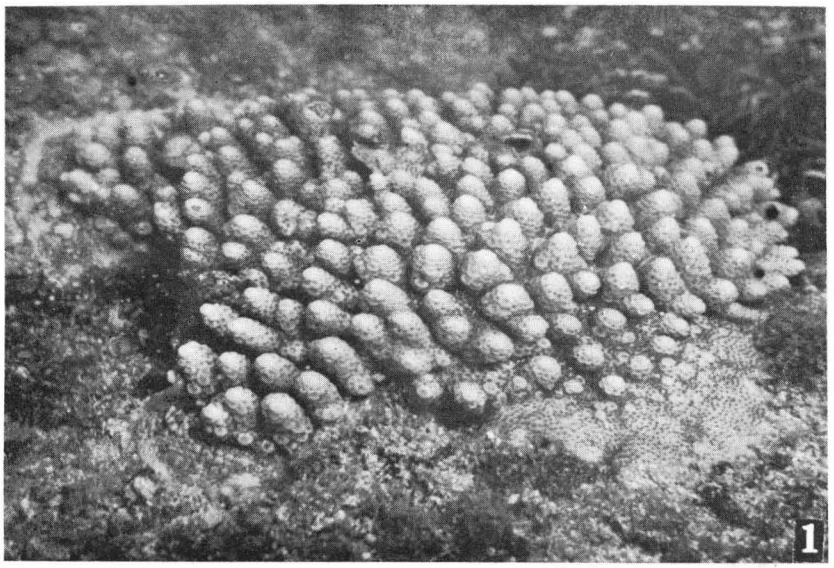
PLATE XXXII

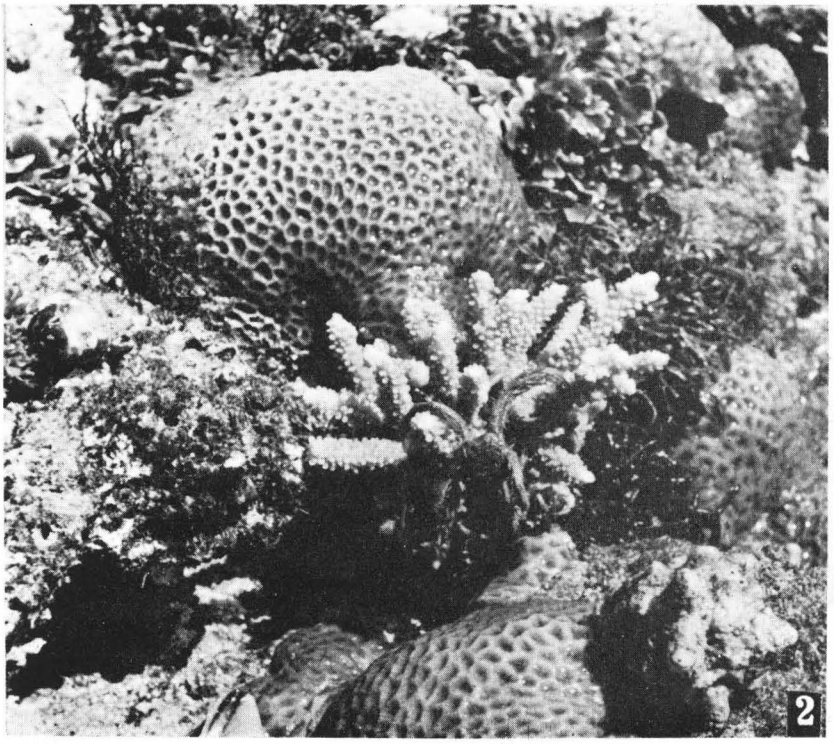
Fig. 3. Specimen of *Acropora formosa* (DANA). ×2/3.

Fig. 4. A part of specimen of *Acropora pectinata* (BROOK), upper surface. Natural size.

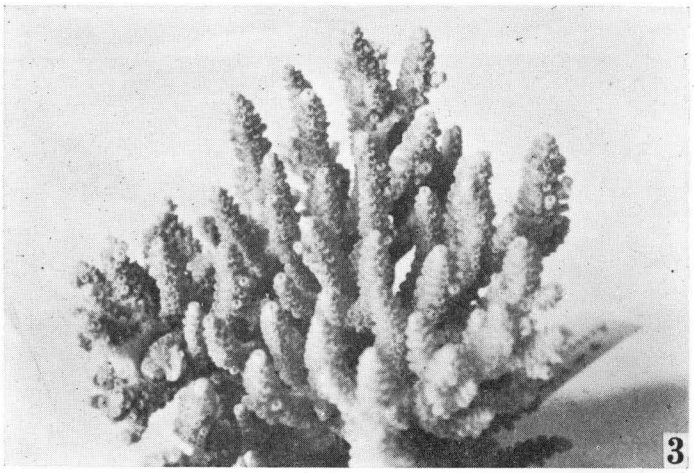
Fig. 5. *Acropora pectinata* (BROOK), three axial corallites. ×7.

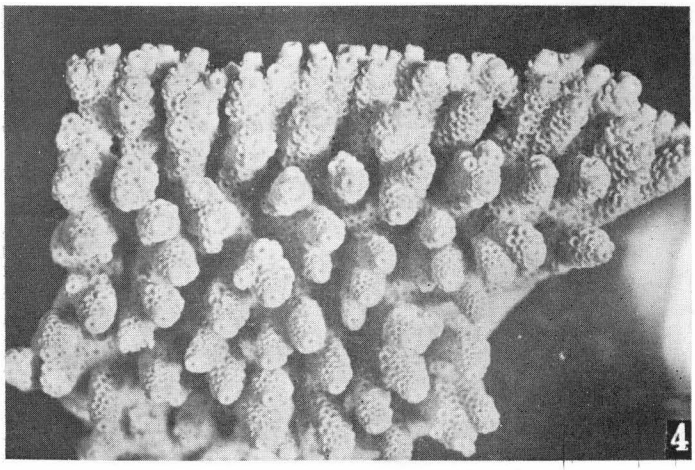
Fig. 6. *Acropora* cf. *hebes* (DANA), exposed at low tide. Photo: O. TUZIMOTO.

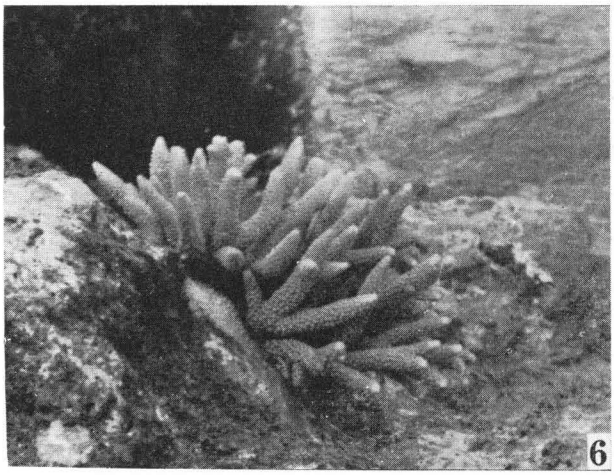


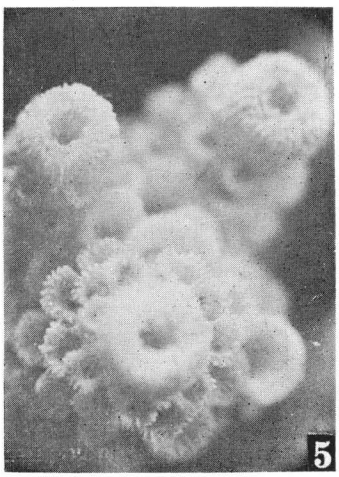


H. UTINOMI: INVERTEBRATE FAUNA OF THE TOKARA ISLANDS, XIV.









H. UTINOMI: INVERTEBRATE FAUNA OF THE TOKARA ISLANDS, XIV.